

3D print ovaries bring hope to mother for many infertile women

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1. Find a mathematical formula that determines how a male sperm swimming
2. A human can be created from a laboratory, without eggs and sperm

In about 5 years, a 3D printed ovarian version for humans will appear.

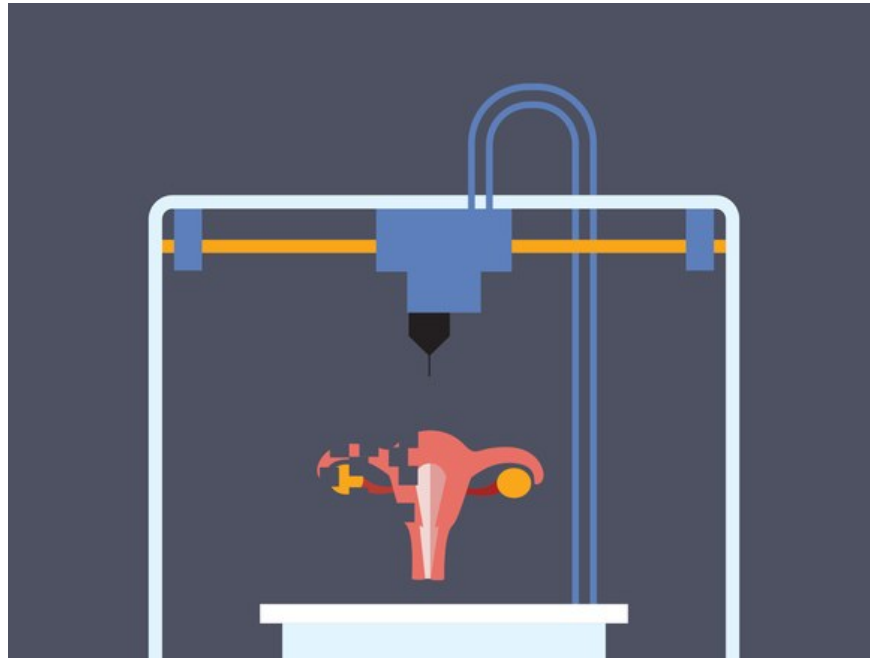


The first mice were born by mother mice with 3D ovaries.

The "holy grail" of regenerative medicine

Previously, donor ovarian transplantation was the method used when a woman's ovaries were damaged. But choosing the right donor source is extremely difficult. The best case is when the patient has a twin sister but not any woman who is inferior is so lucky.

Teresa K. Woodruff, a reproductive scientist and colleague at Northwestern University, created artificial ovaries with biological materials and used 3D printers to print them, opening a new direction in treatment of infertility in women.

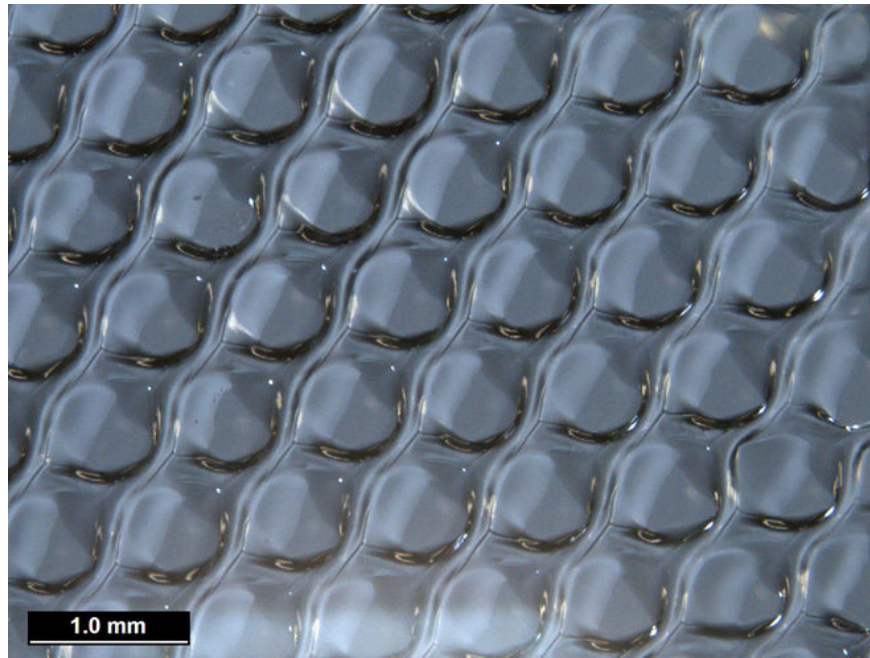


In the future, 3D human body organs will be used.

The research team had to carefully study the structure of the actual ovary to be able to build a biological ovary.

They had to use chemicals to completely remove the follicles, blood vessels and tissues of a real ovary from the donor to obtain an exposed superstructure that is a very complex and tightly woven collagen frame as shown. a net.

This collagen frame of the ovary can be rebuilt using 3D printing technology. But choosing materials to make ink for printers is a problem. The team decided to use collagen and ovarian tissue as the raw material for artificial ovaries. The broken collagen tissue into gelatin, a porous compound, helps to interact easily with tissue and blood of transplanted organisms and is less likely to be eliminated by the body. At the same time, gelatin is a tougher hydrogel than other hydrogel compounds including up to 99% water and a small fraction of the polymer.



An ovarian structure is printed from Gelatin material.

The researchers found a temperature point of gelatin, which allowed it to retain its structure without clumping, to build up multilayer structures. It is about 30 degrees Celsius, if higher structure will be sagging, lower gelatin will shrink.

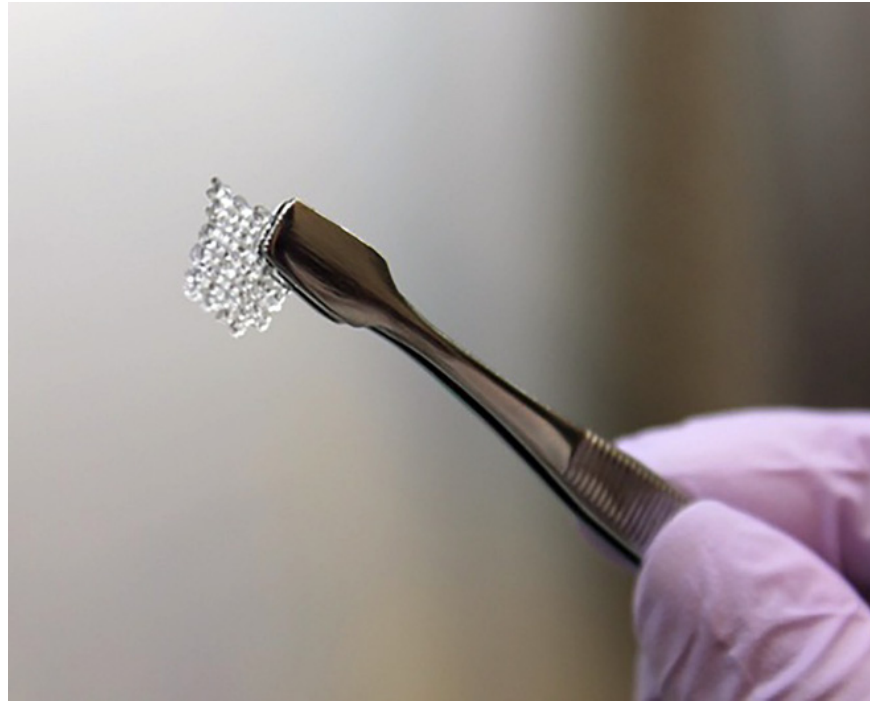
After many attempts to print multiple ovarian tissue with different meshes, the researchers found the optimal model to test on the organism.

Will 3D ovaries work?

Scientists use ovaries to 3D print for nine female mice that have been removed from their ovaries to check the activity of this artificial ovary.

The 3 mice out of 7 that were mating gave birth to their first litter and all the pups born were healthy.

Mother mice also have milk, which means their hormonal signals still work well. Before that, the ovulation of female mice lasted every 4 days. Their pregnancy lasts only 20 days and young mice mature within 4 months.



A multi-layer ovarian structure printed by a 3D printer will be implanted in the mouse.

When can this artificial ovary be used for infertile women?

After a successful test on mice, scientists immediately proceeded to print larger ovaries to serve tests on pigs.

If these tests are also successful, human trials will be conducted. First, it will be an ovary that helps restore hormonal function, then proceed to a perfect artificial ovary, which can replace the natural organ of humans.

An ovary that helps restore hormonal function to activate puberty for young female cancer patients whose bodies are destroyed by cancer treatment before puberty may appear as early as 5 years. next.

The artificial ovaries will follow the life of a baby girl, until she matures and natural menopause. If it was modeled correctly, she could become a normal mother like any other woman.

It will be a huge challenge for the team to make artificial 3D ovaries work well. Because in fact, the ovary is an extremely complex organ, in the chain of hormonal signal connections with the brain and only when the vascular system is effective, the ovulation cycle is perfectly simulated. .

But maybe, thanks to the progressive scientific achievements of the future, our children will be able to "print" from within.

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